Shaw® Shaw Environmental, Inc.

A World of Solutions™

March 28, 2011

United States Environmental Protection Agency - Region 5
ATTN: Mr. Joseph Ulfig - Air and Radiation Division
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Winnebago Landfill Facility – NOV/FOV EPA-5-10-07-IL
Response to USEPA letter, dated February 24, 2011

Dear Mr. Ulfig:

On behalf of Winnebago Reclamation Service (WRS), Shaw Environmental, Inc. (Shaw) is providing a response to your correspondence, dated February 24th, 2011. This response covers the following categories of information:

- Increased Surface Scans
- Well Monitoring
- Flare Relocation Design and Operation
- Landfill GCCS Plans for Northern Expansion
- Waste Acceptance Plan
- Closure Plan

The information will outline the various activities which will be undertaken to minimize odors and ensure compliance at the facility. The supplemental information is provided in the following paragraphs and in the attachments to this submittal. An original and two (2) copies of this submittal are provided.

Increased Surface Scans

USEPA Comment: The proposed approach to surface scans needs to be enhanced the following ways:

1) *Monitoring is to be done around all protrusions in the cover*
2) *Monitoring frequency should be increased (twice a month to start for at least a year, then scaling back)*
3) *Monitoring should be done more frequently in freshly constructed areas, and areas at intermediate cover. WRS should recommend what frequencies make sense for these situations.*
4) *Monitoring, at least visually, can be done during inclement weather events. WRS should recommend what can be done in these instances.*

WRS's Response:

1) All protrusions in the cover will be monitored on a semi-annual basis for 1 year after the landfill cover system has been installed. Should that monitoring identify surface emissions above the NSPS threshold (> 500 ppm of methane above background), then monitoring will

increase to monthly for 3 months after the completion of corrective action per the NSPS (§60.755(c)).

2) Surface emissions monitoring ("SEM") will be performed on a monthly basis for 3 months then will revert back to a quarterly sampling frequency.
3) LFG is typically not generated for 2 to 5 years after waste placement and is dependent on waste content, waste content of the waste, and landfill operations. Therefore, additional monitoring of the newly constructed areas is not warranted.
4) SEM monitoring during inclement weather events will be performed visually. Visual examples of LFG emissions may occur but not limited to: melted snow, bubbles from the cover soils, distressed vegetation, erosion gullies, etc.
5) Note that inspection of LFG wellheads also is addressed in the "LFG Well Inspections & Liquid Level Monitoring SOP" (Attachment No. 1) being provided in response to additional USEPA questions.

Well Monitoring

USEPA Comment:

1) *The information in the Letter regarding liquid levels is good, but action levels must be set, and potential corrective measures identified. Similar measures for low flow wells should be discussed as well.*
2) *Action levels reacting to observed changes in operating conditions of the well should be outlined, as well as what criteria merits escalating to more intensive adjustment and/or repair activities should be outlined.*
3) *Well monitoring frequency was not mentioned in the Letter (Table 1 did not appear to be included). U.S. EPA is looking for a schedule that includes frequent monitoring to demonstrate the good operation of the well field (twice a month to start for at least a year, then scaling back)*
4) *In your submittal, please mention who is responsible for maintaining this information and how it will be retained.*

WRS's Response:

1) Action levels for liquid levels are provided in Table 1 within the revised LFG Well Inspections & Liquid Level Monitoring SOP (see page 1), provided in Attachment No. 1.
2) Action Levels for oxygen, high temperature and pressure are provided within the revised LFG Well Inspections & Liquid Level Monitoring SOP (see Charts 1 and 2), provided in Attachment No. 2.
3) For any closed areas of the landfill (i.e. placement of final cover), WRS will perform bi-weekly wellfield monitoring for 3 months following installation of the final cover then revert to monthly wellfield monitoring. For other areas of the landfill, wellfield monitoring will be performed on a monthly basis.
4) The landfill is currently and will be in the future responsible for maintaining all information related to wellfield monitoring. This information will be retained on-site organized within the landfill data and file management system.

Flare Relocation Design and Operation

USEPA Comment: Please submit a written description of the new system that highlights the major features of this system, is a somewhat more descriptive and/or technical manner than found in the summary in the Letter.

WRS's Response: The North Unit LFG flare has been relocated to an area immediately north and adjacent to the Winnebago Energy Center (WEC). The retrofit will include the addition of modulating valve equipment and pressure transducer that will automate the startup of the flare in the event of a WEC outage or reduction in the collection system vaccuum. The system is designed to maintain a constant negative pressure within the collection system in response to a WEC shutdown or reduction in WEC engine demand. A system operations plan for the candlestick flares is provided in Attachment No. 2.

Landfill GCCS Plans for Northern Expansion

USEPA Comment:

1) *Provide a summary of the of the interval/spacing of horizontal collectors in this area;*
2) *Provide a summary for how WRS will use temporary vertical wells prior to final cover being reached.*

WRS's Response:

1) The horizontal and vertical spacing of the horizontal collectors in the Northern Expansion Unit is 150 feet (horizontal) and 30 feet (vertically). The location and spacing of the horizontal collectors is approximate and will vary based on field conditions at the time of construction.
2) WRS will utilize temporary and permanent vertical LFG wells in areas of the Northern Expansion Unit. The typical criteria for installation of a temporary vertical LFG wells are as follows:
    a. Limited installation of horizontal collectors (i.e. exterior or interior waste slopes);
    b. No additionally waste placement within the well area for 12 months;
    c. Waste thickness greater than 40 feet.

    Based on these criteria, WRS installed vertical 13 vertical LFG wells in the northwest and North portions of the Northern Expansion Unit during May 2010.

Waste Acceptance Plan

USEPA Comment:

1) *In general, a more detailed and formal overall plan needs to be submitted*
2) *The current plan lays out a framework for a longer term study of some interesting parameters, but more concrete steps are needed for the immediate future. For example, pulverized wallboard beyond a certain percentage of a load should not be accepted. Information from your studies can be used to determine waste streams that may still contain sulfur/sulfate in a way that defeats your visual inspections, or to identify sources of sulfur other than wallboard.*
3) *More language on the responsibilities and inspections at each level of waste acceptance/disposal, from the gate to the work face, is needed. Inspection forms for these activities should be made, and retained.*
4) *A robust plan should also include inspections of C&D recycler facilities by WRS personnel to observe their processing schemes, and that wall board is appropriately segregated. Inspection forms for these activities should be made, and retained.*

WRS's Response: With its 12/16 submittal to USEPA, WRS provided a summary of the waste screening procedures being implemented to identify appropriate practices to manage the various

types of construction and demolition ("C&D") debris received at the landfill. USEPA's comment on WRS' submittal highlights the uncertainty in attempting to define operational standards for the types/size fraction/sulfur concentration/quantities of C&D debris used for beneficial purposes (e.g. daily cover) or disposed at a landfill. USEPA notes *"For example, pulverized wallboard **beyond a certain percentage** of a load should not be accepted."*

What is that "certain percentage" that USEPA refers to?

The USEPA, State regulatory agencies, C&D recyclers, and the waste management industry have only recently identified the relationship between management of certain types of C&D debris with the potential for generation of LFG containing significant levels of reduced sulfur compounds. None of the stakeholders involved in this issue have determined the appropriate standards for the types, amounts, or management practices for C&D debris that would address the LFG concerns. It is unrealistic to expect WRS to develop such standards in the context of this pending compliance action.

As you know, recycling of C&D debris has increased dramatically in recent years, with positive environmental and economic benefits being realized from utilizing "processed" C&D debris materials as resources. Governmental policies and economic benefits have spurred tremendous growth in the C&D processing industry. For example, the City of Chicago's "Construction and Demolition Site Waste Recycling Ordinance" currently requires building contractors to recycle at least 50% of the C&D generated by their projects. Many of the counties surrounding the City of Chicago have or are developing similar regulatory programs that will further promote the C&D recycling industry and the quantity of processed C&D debris.

If the amount or size fraction of the gypsum drywall component of C&D debris is the principal cause for increased concentrations of reduced sulfur in LFG, the most logical regulatory approach would focus on the generation of that material. USEPA and the States have ample regulatory authority to specify the maximum percentage of pulverized gypsum drywall that could be included in C&D fines. Alternatively, a regulatory decision could be made that C&D fines containing a "certain percentage" of calcium sulfate or sulfur would be a regulated "waste" and not available for use as alternative daily cover or other beneficial uses at landfills.

Given the uncertainties surrounding C&D fines and other processed C&D debris, WRS can not commit to a specific and enforceable waste acceptance and rejection protocol for that material. However, WRS will continue to conduct the activities identified in its prior submittal and work toward developing criteria to determine whether C&D materials can be accepted at the landfill for beneficial uses, placed for disposal using typical operating practices, requires special handling practices for disposal, or should not be accepted at the landfill.

Closure Plan

USEPA's Comment: We appreciate the pictorial representation of the closure plan for the southern unit, and we request that WRS also put this plan into written form.

WRS's Response: Closure and post-closure care plans for the existing Winnebago Landfill have been approved by the Illinois EPA pursuant to 35 Ill. Admin Code Section 811.704. The Southern Unit will follow the permitted closure and post-closure care plan. For USEPA's convenience, a

summary of the Illinois EPA-approved closure plan for the Southern Unit is provided within Attachment No. 3.

Conclusion

The supplemental information provided in this submittal demonstrates that WRS has taken significant steps to mitigate and control odor emissions at the landfill. WRS will continue to aggressively monitor and implement facility upgrades / improvements to ensure the potential for nuisance odor emissions are minimized.

If you should have any questions, please contact Mr. Thomas Hilbert at 815/963-7516.

Very truly yours,

Shaw Environmental, Inc.

Jesse Varsho, P.E., P.G.

Enc.: Attachments

LIST OF ATTACHMENTS

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ATTACHMENT NO. 1

Revised Well Inspections and Liquid Level Monitoring

LFG Well Inspections & Liquid Level Monitoring SOP

Introduction

The presence of liquids within a landfill gas (LFG) collection device can greatly reduce the LFG extraction rate — specifically, when liquid levels are such that the screened interval of the LFG device is rendered useless or severely blocked. Ongoing routine inspections of the LFG wells and monitoring of liquid levels is vital in maintaining an effective gas collection and control system (GCCS). Winnebago Reclamation Service (WRS) will establish a baseline liquid level at the landfill site, and will routinely perform liquid level measurements at each LFG well on a semi-annual basis. Standard operating procedures (SOP) for the ongoing inspection and monitoring of LFG well liquid levels is detailed below.

Measurement Frequency

Liquid level measurements shall be taken at each GCCS collection well semi-annually at a minimum, and more frequently at LFG extraction devices that do not meet the minimum performance standards as shown on **Table 1**.

Table 1 – Liquid Level Action Table

Action Level	Action
< 1 foot of unsaturated screen and < 15 scfm of gas flow	Install pump and re-monitoring weekly for flow and monthly for liquid level
< 5 feet of unsaturated screen and < 1 scfm of gas flow	Install pump and re-monitoring weekly for flow and monthly for liquid level
< 10 feet of unsaturated screen	Continue liquid level monitoring on a semi-annual basis

Equipment Specifications

A conductance probe meter with an electronic liquid level indicator tape shall be used to perform liquid level measurements at each LFG well. The conductance probe meter will be attached to a permanently marked tape, fitted on a reel. When the indicator tape makes contact with liquid, a loud buzzer and light will be activated. The water level will then be determined by taking a reading directly from the tape. To maintain measurement consistency, liquid levels will be measured from the same point of the well during every monitoring event. The liquid level measuring instrument shall be dedicated to liquid level monitoring in the LFG wells, and shall never be used for groundwater well measurement due to cross contamination concerns.

Equipment Field Calibration Procedure

Before taking the liquid level measurement at the LFG wells, the conductance probe meter shall be checked and calibrated in accordance with the manufacturer specifications.

Liquid Level Measurement Procedure

Field Preparation

WRS site personnel shall obtain the well drill logs and summarize in a table format the anticipated well depths and screened intervals for each LFG well. The summary table shall be used in the field as a reference during all monitoring events. A log book shall be dedicated for liquid level monitoring and shall be updated with each round of monitoring data.

Procedures for Obtaining Liquid Level Measurements

Using a LFG meter, the applied vacuum (static pressure) at each well shall be measured and recorded and the wellhead valve shall be closed. Next the wellhead shall be removed and the liquid level indicator probe shall be slowly lowered down inside the well to the point at which the an audible sound and light are observed from the instrument. A liquid level reading shall be taken from the top of the well casing using the liquid level indicator, and the height of the well casing above ground elevation shall be subtracted from the actual reading — resulting in the liquid level below ground surface (bgs). Next, the liquid level indicator probe shall be lowered to the bottom of the well to determine the bottom well depth, by finding the level at which the indicator probe does not advance. A reading shall be taken and the bottom well depth will be determined by subtracting the well casing above ground elevation. The bottom well depth (bgs) shall be recorded and compared to that which was recorded on the summary well table (prepared from drillers logs) for purposes of confirming screened intervals.

The LFG wellhead shall be reinstalled subsequent to obtaining field measurements, and the wellhead valve shall be opened back to premeasurement static pressure. The stabilized static well vacuum shall be recorded in the the log book.

Potential Field Problems

The following are potential problems that may prohibit or limit the extent to which the indicator probe is advanced down the well casing that should be noted as follows:

- LFG well is leaning too far to allow the indicator probe to progress down the well casing. Record in log book "LFG Well No. ___ is severely leaning and therefore cannot obtain liquid level measurement."
- LFG well may be deflected underground or pinched such that the indicator probe cannot reach the bottom of well casing. Indicator probe may be hung-up on a weld or coupler, or may be snagged on a pump component. A down well camera can be used to identify what is hanging up the indicator probe. This activity must be approved by site manager before proceeding (non-routine work item). Record in log book "Indicator probe gets hung up in well, liquid level will have to be verified using other method (down well camera, chalk tape, water indicating paste, etc.)."
- LFG well has soft bottom due to silt or other material. Record in log book "soft or silty bottom, depth cannot be verified and is therefore estimated." A down well camera can be used to attempt to verify well bottom. This activity shall be approved by the site manager before proceeding (non-routine work item).
- LFG well appears to be deeper than anticipated. Well may have been extended due to landfill operations. A down well camera can be used to determine actual depth of well and how much solid pipe was installed to accommodate landfill operations. These activities must be approved by site manager before proceeding (non-routine work item).

LFG Wellhead Inspection Procedures

While performing the liquid level monitoring, a visual inspection of the LFG wellhead and area immediately surrounding the wellhead shall also be performed. Any irregularities observed shall be documented in the log book and immediately reported to the site manager for corrective actions. Such irregularities may include the following:

- Any areas of localized settlement,

- Visible signs of damage and/or wear to the wellhead, well boot, fernco couplings, mechanical joints, hoses, GCCS connections, etc.,
- Presence of landfill gas odors,
- Audible sounds (hissing), and
- Wellhead tuning valves do not completely open and close or do not operate smoothly through full range.

If any damage or irregularities were documented during the previous liquid level monitoring event, then confirm whether the problem still exists. Document whether all such damage and irregularities still exist or no longer exist.

Liquid Level Data Management

All recorded liquid levels shall be maintained in an electronic spreadsheet file by well ID/name, and shall also include date of well installation, well GPS coordinates (northing and easting), original ground elevation (at time of installation), length of constructed solid pipe, length of perforated pipe, and original depth to bottom. The spreadsheet shall be updated after every liquid level monitoring event with the following information:

- Current well elevation either from recent survey or field handheld GPS unit,
- Date of monitoring event,
- Measured depth to liquid,
- Measured depth to bottom,
- Calculation of current solid pipe length utilizing GPS elevations,
- Calculation of feet of available perforations,
- Calculation of percentage of screen available, and
- Calculation of loss in well depth.

Wellfield Monitoring Operating Conditions Limits and Actions Procedures

The ultimate goals of balancing and tuning a wellfield are to: maintain the wellfield in compliance with federal, state and local regulations; maintain compliance with all applicable permits, control odors; and control lateral migration and fugitive emissions of landfill gas. The wellfield operating limits and associated corrective action flow charts are summarized below:

- Pressure >0" Water Column (see Flow Chart 1)
- Oxygen levels < 5% (see Flow Chart 2)
- Wellhead Temperature > 131°F (see Flow Chart 3)

Chart 1
Procedural Flow Chart for Wellfield Oxygen Exceedances (>5%)

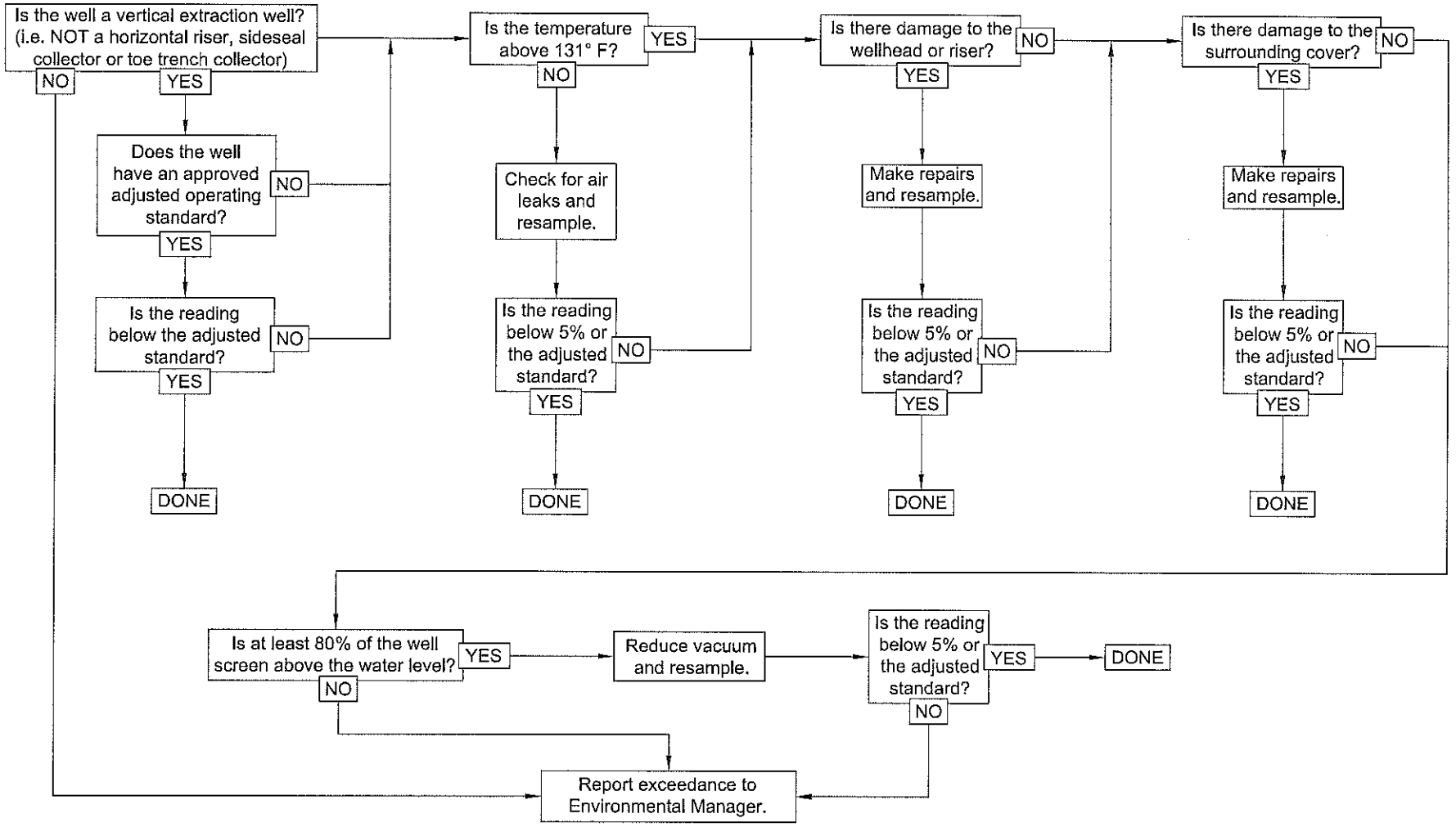

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Chart 2

Procedural Flow Chart for Wellfield Pressure Exceedances (>0" Water Column)

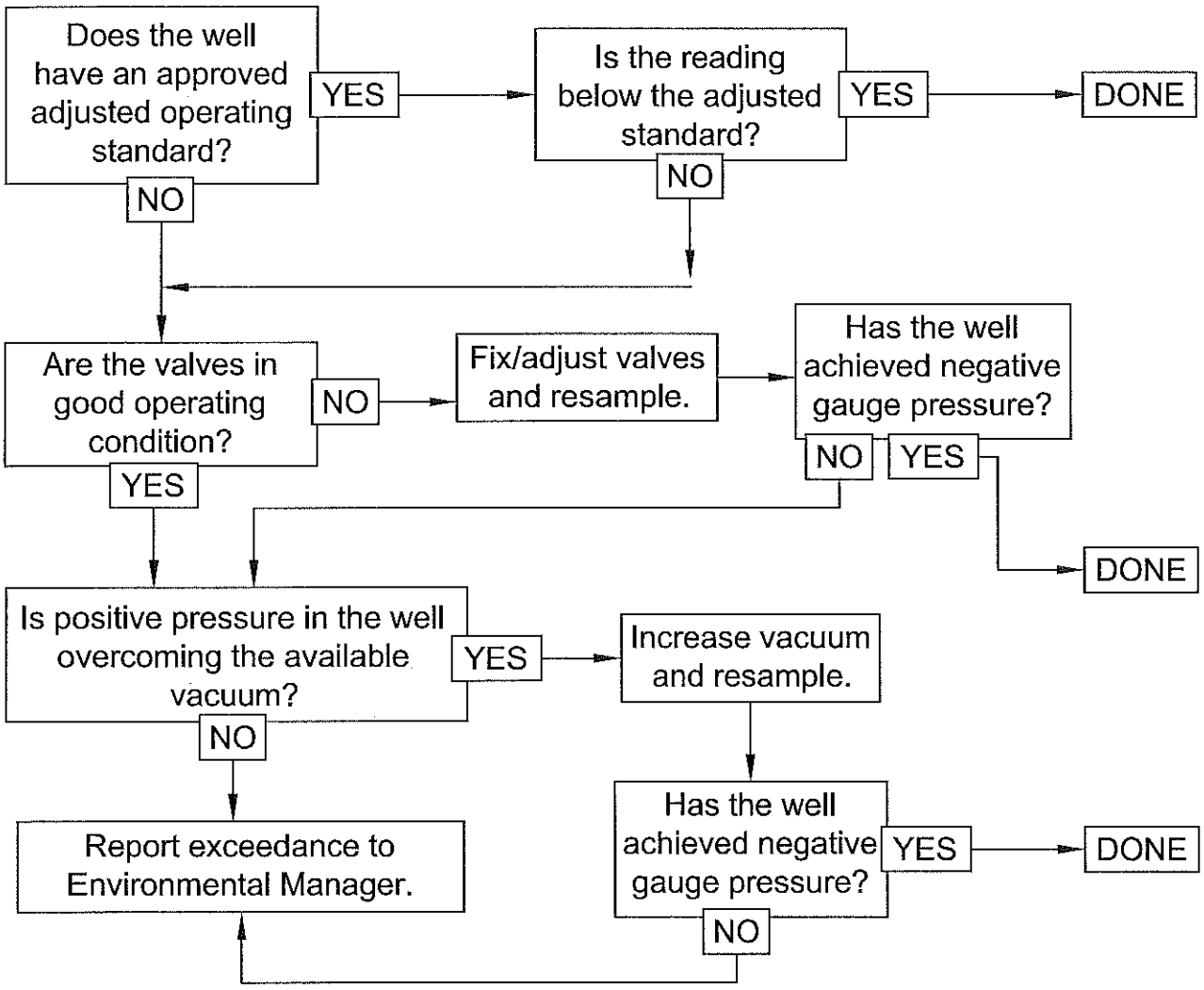
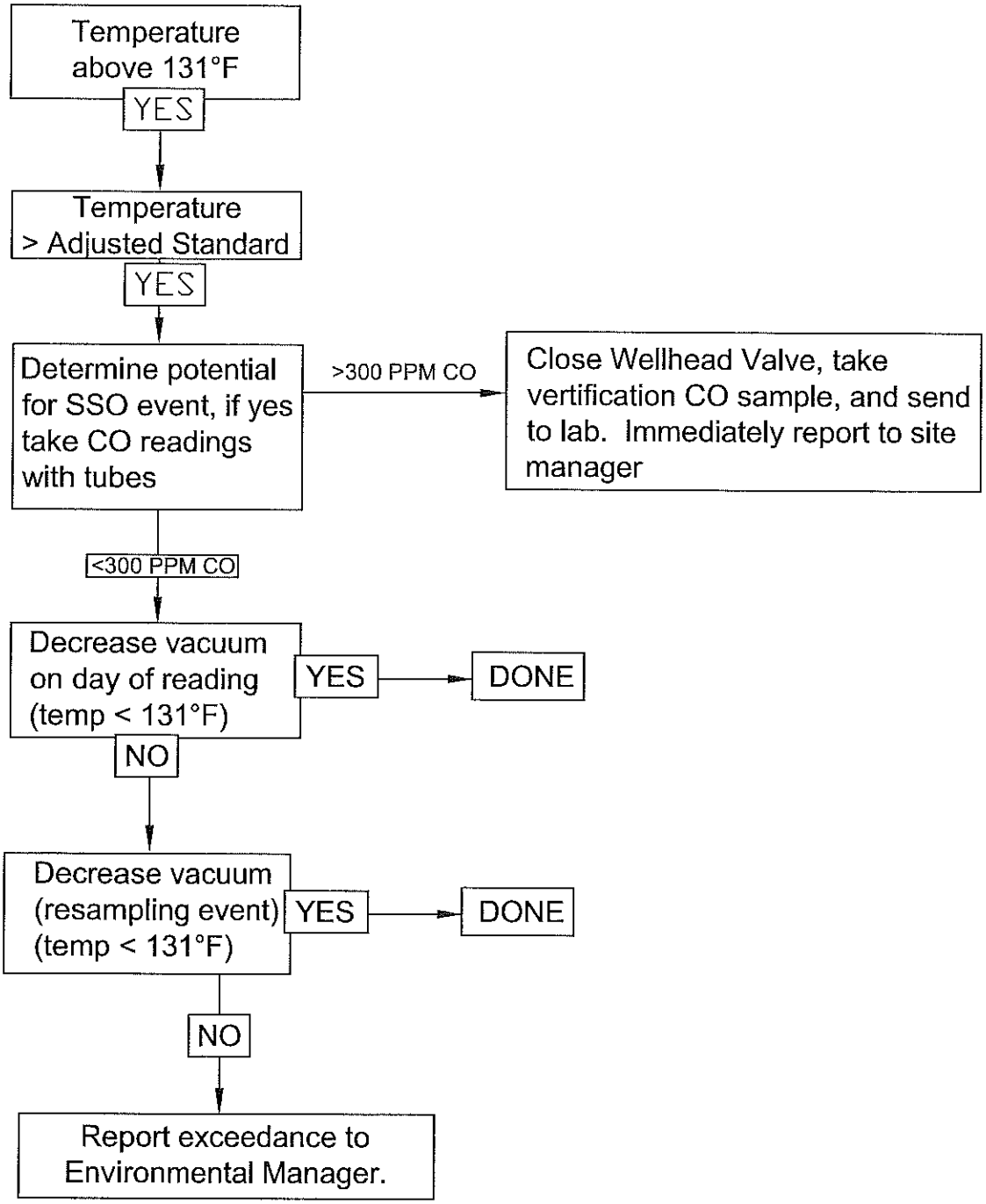


Chart 3

Procedural Flow Chart for Wellfield Temperature Exceedances (>131°F)



ATTACHMENT NO. 2

Flare System Operations Plan

System Operation Plan for Candlestick Flares

I. CONTROL SYSTEM OPERATION:

A. Detailed Startup Sequence

1. Pre-Start Checklist

The following lists startup conditions that must be met to permit an automatic startup sequence of the enclosed flare system:

A. Master switch in the ON position

B. E-Stop button in the extended position

C. Absence of any alarm conditions - The red flashing alarm beacon (located on top of the control panel) and the operator display will indicate if there are any alarm or fault conditions present. All fault conditions must be cleared to permit a start sequence.

D. Inlet valve in the closed position

E. Pilot temperature below the Blower-On set point

F. Absence of any flame

G. Control Mode switch in the Auto position

H. Select 1 or 2 blowers selector Switch in the Auto position If two are selected, select which blower is to lead and which blower will follow when the flare "Demand" is sufficient and requires two blowers to maintain inlet suction pressure.

I. Set the inlet pressure set-point for the blower. This will regulate the amount of suction behind the north and south control valves.

J. Set the north and south inlet pressure set-points. This will be the pressure pulled on the two major landfill zones by the flare. Each zone (north and south) is separately controlled by the north and south control valves, as reported by the north and south pressure transmitters.

2. Ignition (Pilot) Cycle

The ignition cycle establishes an initial flame and heat source to generate adequate temperature prior to introducing the flow of landfill gas.

A pilot gas source, in conjunction with automatic spark ignition, is used to establish the initial flame. Propane is typically used for the pilot gas source.

The Ignition Timer set point is adjustable (typically 15 to 30 seconds.) A pilot thermocouple is used to monitor the pilot gas flame and is used to determine when to start the gas blowers (Blower-On set point) and open the header valve, allowing the flow of landfill gas. The pilot temperature

measurement is also used to determine at what temperature (Pilot-Off set point) to discontinue the use of the pilot gas.
The Pilot Timer is used to indicate pilot system malfunction or failure and is user adjustable (typically 5 minutes.) If the pilot temperature does not reach the Pilot-Off set point before the Pilot Timer times out, a pilot fault will occur.

3. Combustion of Landfill Gas

Landfill gas is drawn from the landfill and sent into the flare stack for proper destruction using gas blowers.

Once adequate heat in the stack (for proper combustion) has been reached, determined by the measured pilot temperature, the gas blowers are started and the header valve is opened. This event is determined by the Blower-On set point (typically 300 °F) which can be adjusted to meet process requirements.

Blower startup and header valve position are monitored to ensure proper equipment operation. A blower auxiliary fault or header valve fault will occur if abnormal operation or positioning is detected.
After the combustion of landfill gas has begun, flame detection and low temperature detection are enabled.

4. Continuous Monitoring

Once the combustion of landfill gas has begun, certain conditions must be met to ensure proper combustion under safe operating conditions.

Ultra violet flame detection (UV eye) monitors the presence of a flame in the stack. In the event the flame is extinguished, the pilot ignition system will try to "re-ignite" the flame. Failure to re-ignite will result in a flame fault and the appropriate shutdown actions will occur.

The landfill gas flow, typically measured in standard cubic feet per minute (scfm), is also monitored, recorded, and displayed to indicate proper flare operation. High gas flow alarming is also in place to insure the gas flow does not exceed the capacity of the flare stack, which may result in and unsafe operating conditions and equipment damage.

5. Automatic Re-start

The flare will automatically attempt a re-start under the following fault conditions:

a. Low temperature shutdown

b. Flame failure shutdown

c. Pilot Failure shutdown

An automatic re-start will occur after the "Down Timer" has elapsed and the temperature has dropped to allow for a safe startup. A re-start consists of the same sequence of events as a typical startup, beginning with the purge cycle. A re-start limit, typically 3, is also used to limit the number of re-starts that can occur before a successful startup has been accomplished. If the number of restart attempts reaches the limit, the system will shutdown and operator attention is required.

6. **Automatic Flare Start Mode**
The flare will automatically start as the engine plant stops, or slows down under the following conditions:

a. North mode is selected and the north well field pressure rises above the north start flare set-point.

b. South mode is selected and the south well field pressure rises above the south start flare set-point.

c. Blower mode is selected and the blower inlet pressure rises above the blower start flare set-point.

An automatic start up will occur when ever any of the above conditions are met. The control is selectable such that any 1, 2 or all of these set-points are examined to enable auto start and the ones not selected are disabled.

7. **Automatic Flare Stop Mode**
When enabled the flare will automatically stops and enters "Standby Mode" as the engine plant starts, and pulls all the landfill gas from both the north and south well fields, when the gas is going to the engines the flare will not be able to operate.

a. North Well field pressure is pulled low (by engine plant demand) causing the north control valve to close below the North stop flare set-point.

b. South Well field pressure is pulled low (by engine plant demand) causing the south control valve to close below the South stop flare set-point..

c. Blower VFD speed falls below the stop flare blower speed set-point

An automatic stop will occur when ever any of the above conditions are met. The control is selectable such that any 1, 2 or all of these set-points are examined to enable auto stop and the ones not selected are disabled. Furthermore, if both north and south are enabled then the flare will only stop when both valves are closed below the minimum valve position set-point. This allows the flare to continue to operate as the well field are sequenced up and down.

ATTACHMENT NO. 3

Summary of Closure Plan –
Southern Unit of the Winnebago Landfill

SECTION 2.9

CLOSURE AND POST-CLOSURE CARE PLAN

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2.9 CLOSURE AND POST-CLOSURE CARE PLAN

Introduction

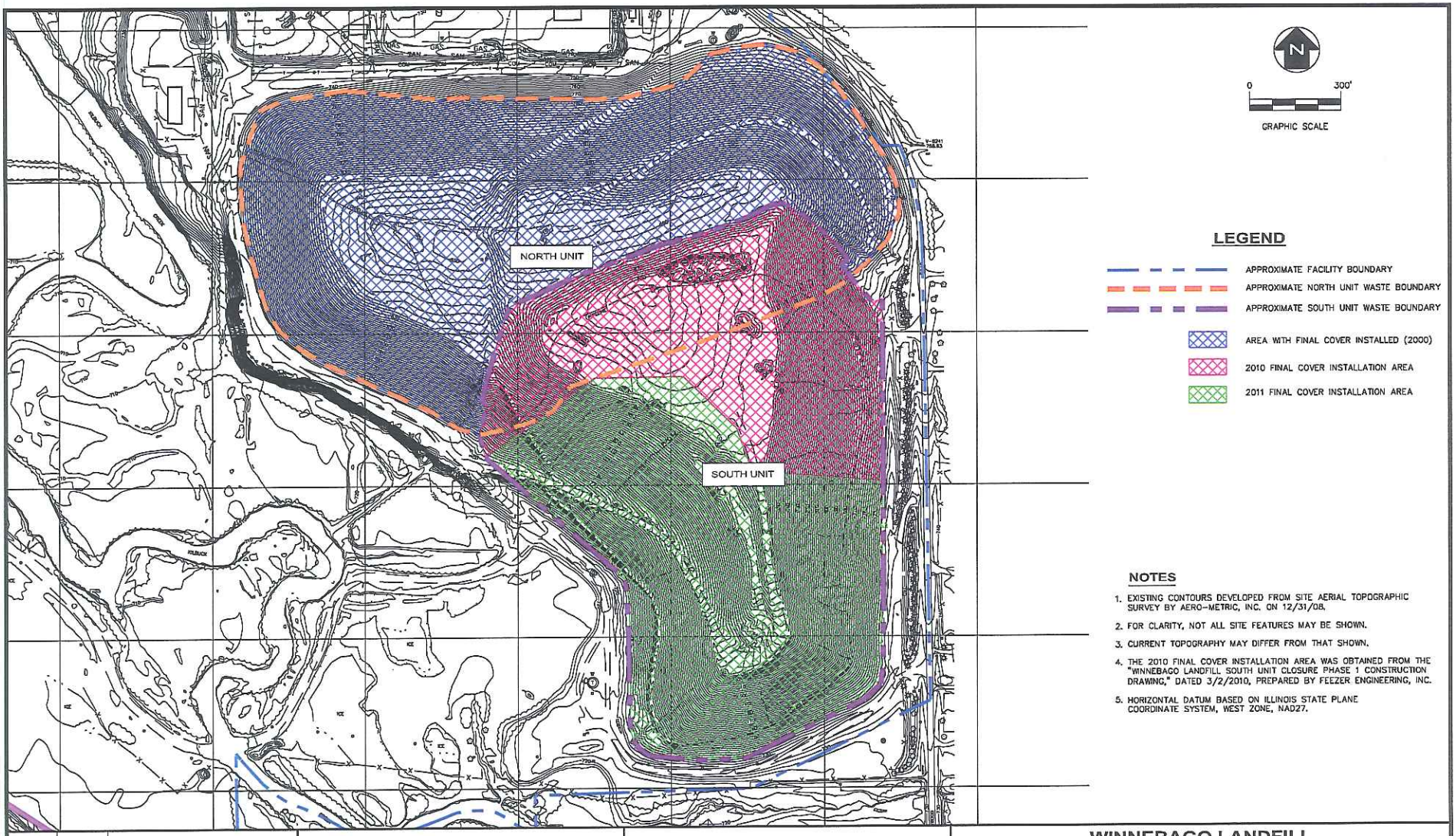
Closure and post-closure care plans for the existing Winnebago Landfill have been approved by the IEPA pursuant to 35 Ill. Admin Code, Section 811.704. The southern unit will follow the permitted closure and post-closure care plan.

Routine Closure

Routine final closure will occur when all permitted areas have been completed according to the submitted plans. Since final cover will be placed as final waste grades are attained, only the last cells should require final cover at routine closure. An area of no more than approximately 23 acres will require closure activities under routine closure as shown on Figure 2.9-1. In total, approximately 39.47 acres of final cover will be placed at the Winnebago Landfill South Unit throughout its operating life.

Final Cover was installed in the northern portion of the south unit (16.63 acres) during 2010. It is anticipated that final cover will be installed on the remainder of the south unit (22.84 acres) during 2011. It is assumed that the following scenarios will apply at the time of closure based on a closure area of 39.47 acres on the Assumed Closure Date:

- ❑ All soil materials for construction of the final cover material and performance standards will be obtained from on-site sources.
- ❑ Structures are not currently proposed to be built over the landfill area.
- ❑ A landfill gas monitoring system will have already been developed,
- ❑ Prior to operating authority in a new area, the adjacent groundwater monitoring wells will have been installed.



NOTES

1. EXISTING CONTOURS DEVELOPED FROM SITE AERIAL TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. ON 12/31/08.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. CURRENT TOPOGRAPHY MAY DIFFER FROM THAT SHOWN.
4. THE 2010 FINAL COVER INSTALLATION AREA WAS OBTAINED FROM THE "WINNEBAGO LANDFILL SOUTH UNIT CLOSURE PHASE 1 CONSTRUCTION DRAWING," DATED 3/2/2010, PREPARED BY FEEZER ENGINEERING, INC.
5. HORIZONTAL DATUM BASED ON ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD27.

REV. NO.	DATE	DESCRIPTION

Winnebago Landfill

Shaw® Shaw Environmental, Inc.

WINNEBAGO LANDFILL
ROCKFORD, ILLINOIS

FIGURE 2.9-1
FINAL COVER PHASING PLAN

DRAWN BY:	PEL	APPROVED BY:	PCT	PROJ. NO.:	137863	DATE:	APRIL 2010

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Final Cover System

The Winnebago Landfill - Southern Unit will be covered with an engineered final cover system which will meet or exceed all federal, state, and local requirements. The final cover will be used to: 1) minimize the infiltration of precipitation, 2) prevent the release of landfill gas to the atmosphere, 3) support vegetation, and 4) eliminate accessibility to the waste by vectors. The proposed final cover system, which is permitted at the existing Winnebago Landfill, is a multi-layer system consisting of:

- Twelve-inch (12") thick low permeability compacted material cover (maximum hydraulic conductivity of 1.0×10^{-7} cm/sec).
- A double sided textured 40-mil LLDPE or equivalent geomembrane liner.
- Geocomposite Drainage Net.
- A minimum three-foot (3') thick protective layer overlaying the low permeability layer, with the uppermost six (6) inches consisting of soil suitable for vegetation.
- A vegetation layer.

The following text provides a more detailed description of each layer within the final cover system.

Low Permeability Layer

The low permeability layer will have a hydraulic conductivity of 1.0×10^{-7} cm/sec or less. The final cover will be placed in lifts and then compacted with a sheepsfoot roller. Each soil layer will be uniformly placed with all roots, cobbles, debris, organic, and other deleterious material removed prior to compaction. Additionally, the final surface will be inspected prior to geomembrane installation to ensure that no rocks, roots, or other objectionable items are exposed on the cover surface. The low permeability final cover layer will be compacted to 90 percent Standard Proctor density (ASTM D 698) at a moisture content 0-6 percent above optimum moisture. All construction will be conducted and documented in accordance with the procedures outlined in the permitted Construction Quality Assurance Program.

Geomembrane Layer

A linear low density polyethylene (LLDPE) double-sided textured geomembrane material or equivalent will be included in the composite final cover system for the facility. Current plans call for the geomembrane material to consist of a double-sided textured 40-mil LLDPE geomembrane liner. The material specifications for the 40-mil geomembrane liner material are included in Section 2.5 of this application. The geomembrane layer will serve as an impermeable barrier against infiltration of moisture through the final cover into the landfill as well as a barrier preventing landfill gas from migrating out of the landfill. The geomembrane will be installed and tested in accordance with the requirements of the permitted Construction Quality Assurance Program.

Geocomposite

Overlaying the geomembrane layer is a geocomposite drainage net. The geocomposite consists of a geonet sandwiched by two non-woven needle-punched geotextiles. The

geocomposite will serve two purposes. The first is to lower the hydraulic head acting on the final cover and therefore increase the slope stability of the final cover. The second purpose is to provide a cushion layer between the 40-mil LLDPE geomembrane and the protective layer. The geocomposite will be installed and tested in accordance with the requirements of the permitted Construction Quality Assurance Program.

Protective Layer

A protective layer consisting of a minimum of thirty-six (36) inches will be placed over the geocomposite to protect the compacted low permeability layer from frost, desiccation, erosion, and penetration by roots or vectors. The drainage layer will decrease the hydraulic head build-up on the final cover geomembrane. On-site material will be supplied for use in constructing the protective layer. The uppermost six (6) inches of the material will consist of soil capable of supporting vegetation. The protective layer will be tested and placed in accordance with the requirements detailed in the permitted Construction Quality Assurance Program.

Vegetative Cover

The vegetative cover planned for the Winnebago Landfill West Expansion is intended to protect and enhance the environment by providing a native landscape representative of the grasses of north-central Illinois. The vegetative cover will be placed after completion of the protective layer at the appropriate time for successful germination and growth.

The vegetative cover will consist of a wide variety of natural grasses that will: 1) protect the soil surface against erosion; 2) not interfere with the integrity of the low permeable layer; 3) cover with suitable substrate and growing medium to provide for sustained plant growth; 4) increase evapotranspiration thereby minimizing infiltration into the landfill; 5) provide for sufficient stormwater management and flood control; 6) establish a diverse grassland habitat; 7) be resistant to landfill gas; and 8) improve the appearance of the final land surface.

Time of planting is a critical factor in successful establishment of plants from seeds. Seed will be planted at the appropriate time for successful germination and growth based on soil temperature and precipitation, to be determined each year at the time of planting. Generally, seed will be planted before June 10 or after September 1. Mulch will be applied as needed to control erosion and enhance vegetation establishment.

Final Cover Construction and Maintenance

The final cover will be constructed in accordance with the construction quality control guidelines outlined in the comprehensive permitted Construction Quality Assurance Program. The low permeability layer of the final cover system will be constructed no later than 60 days after placement of the final lift of solid waste. The final protective layer will be placed as soon as possible after placement of the low permeability layer to prevent desiccation, cracking, freezing or other damage to the low permeability layer. The final protective layer will be thirty-six-inches (36") in thickness. The average depth of frost penetration in Illinois is 36-inches as shown on the standard frost penetration map taken from the U.S. Department of Commerce Weather Bureau Data and as reported in "Final Covers For Solid Waste Landfills and Abandoned Dumps," p.56, by Robert M. Koerner and David E. Daniel, 1997.

Additionally, based on our experience with liner and cap construction in Illinois the frost depth is substantially less. The final protective layer is therefore sufficiently thick to prevent frost penetration into the underlying low permeability layer. Cover maintenance will be performed as necessary to maintain the final cover to meet the design objectives.

Cover Percolation

After placement of final cover, virtually all of the precipitation which falls on the landfill will be diverted into the stormwater management system. Controlled runoff, evaporation, and evapotranspiration will minimize percolation through the final cover system.

Final Landform

The proposed landscaping around the Winnebago Landfill West Expansion will include the extension of berms and planting of natural grasses. Native prairie grasses and other suitable grasses will be used for the vegetative cover, which will provide erosion protection. The grass seed mixture which is selected will be amenable to the soil quality/thickness, slopes and moisture/climatological conditions that exist and will not require significant maintenance. The seed mixture will be selected to protect the low permeability liner system from root penetration. Generally a protective layer that is 450 mm (17.7 in.) to 600 mm (23.6 in.) is adequate[1]. Since the protective layer will be thirty-six-inches (36") thick and the grass seed mixture will be carefully selected, the protective layer is deemed more than adequate to prevent root penetration from occurring in the low permeability layer. Long-term management of grassed areas will require regular mowing. Fertilizer, lime, and mulch will be used at rates necessary to establish proper growth of the seed.

Routine Closure

Routine final closure will occur when all disposal areas have been filled to permitted grades. As outlined below, the procedures described in the premature closure plan will be followed except as noted.

Notification of Closure

Closure activities will begin no later than 30 days after the landfill receives the final volume of waste. The IEPA will be notified during this period that closure has been initiated.

Equipment Decontamination

Equipment decontamination will occur at the end of closure activities and will be conducted as described in the premature closure plan.

Site Security

A fence will be placed to restrict access to the facility as development progresses, and will be completed prior to final closure of the facility. At the time of landfill closure, the fence will be inspected and repaired as needed. A sign will be placed near the entrance that states the facility is closed.

Stormwater Management

Grading of the final lifts of waste is considered an operational task and is not considered an element of routine closure. By the time of routine final closure, all of the stormwater management structures will be in-place. The stormwater management system is designed to

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[1] Koerner, R.M., and D.E. Daniel. Final Covers For Solid Waste Landfills and Abandoned Dumps. ASCE Press, 1997.

pass the peak 100-year, 24-hour and 100-year, 1-hour precipitation events without scouring or erosion after closure.

Final Cover Placement

An area of approximately 22.84 acres will require final cover. The low permeability layer will be constructed no later than 60 days after placement of the final lift of solid waste. The final protective layer will be placed as soon as possible thereafter to prevent desiccation, cracking, freezing or other damage to the low permeability layer.

After placement of the low permeability layer and protective layer, the 22.84 acres will be seeded with native prairie grasses and other suitable grasses to minimize wind and water erosion. Seeding will occur during optimum planting periods.

Landfill Gas Control

At the time of routine closure, all landfill gas probes and ambient air monitoring locations will have already been constructed. The design and location of these devices is discussed in more detail within Section 2.3 of this application.

Groundwater Monitoring

All groundwater monitoring wells will have already been constructed at the time of routine closure.

Certification of Closure

Both the Operator and a Professional Engineer will certify to the IEPA that closure has been completed in accordance with this closure plan and the CQA program. Plan sheets for the closed site will be attached to the certification.

Documentation

A plat of the completed site will be filed with the appropriate Kendall County land recording authority. A Professional Land Surveyor will prepare and file this plat. The owner or operator shall record a notation on the deed to the landfill property or other appropriate instrument in such a way that any potential purchasers will be notified in perpetuity that 1) the land has been used as a landfill facility, and 2) its use is restricted pursuant to 35 Ill. Admin. Code, Section 811.111(d). The owner or operator shall notify the IEPA that the notation has been recorded and a copy has been placed in the operating record.